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ARE ALGORITHMS BIASED?

MASHINES ALGORITHM, MACHINES, MATHEMATICS, NON-TECHNOLOGY

The politics of algorithms has been on people's minds a lot recently. Only a few years ago, tech authors were still hawking Silicon Valley as the great hope for humanity. Today one is more likely to see books about how math is a weapon, how algorithms are oppressive, and how tech increases social inequality.

The incendiary failures are almost too numerous to mention: a digital camera that thinks Asians have their eyes closed; facial recognition technologies that misgender African-American women (or miss them entirely); Google searches that portray young black men as thugs and threats. A few hours after its launch in 2016, Microsoft's chatbot "Tay" was already denying the Holocaust.

It used to be that if you wanted to explore the political nature of algorithms and digital media you had to go to Media Studies and STS, reading the important work of scholars like Lisa Nakamura, Wendy Chun, Seb Franklin, Simone Browne, David Golumbia, or Jacob Gaboury. (Or, before them, work on cybernetics and control from the likes of Gilles Deleuze, Donna Haraway, James Beniger, or Philip Agre.)

Now the politics of computation has gone mainstream. Social media followers no doubt saw the recent video clip in which New York congresswoman Alexandria Ocasio-Cortez claimed that algorithms perpetuate racial bias. And in a recent *New York Times* column, legal scholar Michelle Alexander quoted Cathy O'Neil's argument that "algorithms are nothing more than opinions embedded in mathematics," suggesting that algorithms constitute the newest system of Jim Crow.

I too am interested in the politics of computation, and have tried, over the years, to approach this problem from a variety of different angles. The specter of the "Chinese gold farmer," for instance, has been an important topic in game studies, not least for what it reveals about the ideology of race. Or, to take another example, network architectures display an intricate intermixing of both vertical hierarchy and horizontal distribution, which together construct a novel form of "control" technology.

A topic that has captured my attention for several years now — although I've only yet written about it episodically and tangentially — is the way in which software (including its math and its logic) might itself be sexist, racist, or classist. And I don't mean the *uses* of software. Use is too obvious; we know that answer already. I mean numbers like 5 or 7. Or the variable x . Or an *if/then* control structure. Or an entire computer language like C++ or Python. Do these kinds of things contain inherent bias? Could they be

sexist or racist?

Uses of tech is one thing. Tech itself is another. Even the most ardent critics of Amazon or Google will frown and backpedal if one begins to criticize algebra or deductive logic. It's the third rail of digital studies: don't touch. For instance, some of you might remember the uproar a few years ago when Ari Schlesinger suggested designing a feminist computer language. How dare she! The very notion that computer languages might be sexist was anathema to most of the Internet public, fomenting a Gamergate-style backlash.

While I intend to make this kind of argument more explicitly in the future — the argument that mathematics itself is typed if not also explicitly gendered and racialized — I won't do that here. Suffice it to say that the topic interests me a great deal. What I want to present here is an annotated collection of the various attempts to *resist* such a project, the many voices — so loud, so cocksure — that aim to silence and subdue the politicization of math and code.

But before starting, a few caveats. First, math, logic, and computation are not the same thing. Given more time it would be necessary to define these terms more clearly and show how they are related. Personally I consider math, logic, and computation to be intimately connected, often so intimately connected as to reduce one to another. For instance, in the past I've made claims like "software is math"; I acknowledge that others might be uncomfortable with this kind of reduction.

Second caveat: Race, class, and gender are not the same thing. I'm referencing them together here because they evoke a specific kind of cultural and political context, and because they all emerge from processes of discretization and difference. A richer discussion would necessarily need to address the complex interconnection between race, class, gender and other qualities of lived experience.

Third caveat: There are people working on these topics who do not fall into one of the responses below — see paragraph three above for some initial suggestions. I am aware of many of them, but of course not all of them, so please feel free to alert me to relevant references if you feel so moved. My intent is not to ignore or silence people. I am focusing on these responses because, in my assessment, they represent the set of dominant positions.

In documenting the resistance to the politicization of math and code, I've paraphrased and condensed texts found online and in various kinds of public debate. The italicized block quotes below are fictionalized accounts, but based on things said by real people. Each fictionalized account is followed by my own commentary. Note that I'm omitting all manner of bad-faith responses of the form "woman are inherently bad at math." The responses below are all examples of good-faith responses from people who consider themselves more or less charitable and reasonable.

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Response #1: "Pure Abstraction"

"Math is the pursuit of abstraction and formal relation. Math expresses number in its purest form. Algorithms, math, and logic are agnostic to people and their specific qualities. An algorithm has no political or cultural agenda. It does not matter if you are a man or a woman. In math, a correct answer is the only thing that matters."

Perhaps the most common response, particularly among mathematicians and computer scientists, is to occupy the position of, shall we call it, Naive Abstraction. Here math is entirely uncoupled from the real world. It merely expresses the clearest, most rigorous, and most formal relation between abstract entities. Even if they are unlikely to admit it publicly, most mathematicians are Platonists; most of them secretly (or not so secretly) think that mathematical entities exist in a realm of pure, formal abstraction.

Response #2: "Politics Unwelcome Here"

"How silly to try to classify mathematics along political or social lines. You are misusing math to further a personal agenda. If math has a cultural or political agenda, the agenda is invalid because agendas by definition deviate from the pure and abstract nature of math. A 'feminist mathematics' is simply nonsense; the very notion conflicts with the basic definition of mathematics. Math is pure abstraction uncoupled from world-bound facts such as race, ethnicity, gender, class, or culture."

The second response is similar to the first. Here, Naive Abstraction still holds, only its proponents have become more aggressive in defending their turf. That's just not how math works, they say, and to suggest otherwise is to commit an infraction against mathematics. Politicizing mathematics means subjecting it to an external reality for which it was never intended. It constitutes a kind of category mistake, they claim. Let's keep math over here, and politics over there, and be careful not to mix them.

Response #3: "Your Terms Aren't Clearly Defined"

"Who says math is the pursuit of pure abstraction, insensitive to the real world? Innumerable mathematicians have recognized the importance of observation and even experimentation in the development of mathematical knowledge. Math can be applied, even empirical — just ask any working scientist. And you overlook the extensive attention given within mathematics to real phenomena in disciplines like geometry, topology, or calculus. Hence your terms aren't clearly defined. Math is complex, so don't make indictments based on generalizations; deal instead with specific cases."

The debate starts to get more sophisticated now. Mathematicians and computer scientists are not dumb. They know how rich

and varied their field is, from pure mathematical research (for instance, trying to provide a proof of the Goldbach Conjecture), to deeply embedded empirical analysis of graph theory in neural nets. Still, this produces a kind of Nominalist Skepticism toward generalized definitions of math (to which any political indictment would necessarily need to appeal). By Nominalist Skepticism I mean the notion that there can be no general assessments made about logic, math, or code as a whole; it's useless to "name" math in specific ways, to assign certain laws or tendencies to it. General assessments are too speculative. Math is just too complex to contain under one roof. One ought better to spend one's time just working on specific problems.

Response #4: "Essentialism Is Bad"

"Certainly math can be understood culturally and politically, but to define math in this way means to assign it an essence, and essentialism is the worst form of cultural and political misuse. There is no essence to form or structure. A form gains its definition through encounters with other forms. Structures gain their meanings only after being put into exchange with other structures. Tech has no essence; to offer a rigid definition is to be guilty of essentialism."

Now we have the same problem as before, only in reverse. Here the respondent might freely acknowledge the cultural and political valence of algorithms or code. They might even reject nominalism and acknowledge that math has general characteristics. However this introduces a new threat that must be resisted: essentialism. To define something is to assign it an essence. And since we already know essentialism is bad — thanks to a few decades of poststructuralism — this approach is destined to fail. Don't try to politicize things because you'll simply expose yourself to even greater hazards. (Try ethics instead.)

Response #5: "Not My Problem"

"Cultural and political concepts like race or gender might be interesting, but that's just not my topic. They're specific to particular contexts, while I'm looking at generalizable phenomena. Since race/class/gender aren't generalizable mathematically, it's safe to ignore them."

The dynamic between general and specific can also be leveraged in other ways. A common technique is to suggest that race, class, or gender are "particulars"; they pertain to particular contexts, to particular bodies, to particular histories. And, as particulars, they do not rise to the level of general concern. Thus the Not My Problem folks often think they are operating in good faith even while avoiding or dismissing politics: yes, I care about your plight; but it's yours alone; I'm simply interested in other things (birdwatching, stamp collecting, prime numbers).

Response #6: "Focus on Subjects"

"Yes, of course math is a cultural and political technology. Math is a tool of governmentality that constructs and disciplines subjects. Instead of studying math for its own sake, focus on how math produces subjects. Given that tech inscribes power onto bodies, effects will be visible in how subjects are coded and organized."

Thus far we've been considering responses from people who are typically outside the field of critical digital studies. The two final responses — responses 6 and 7 — are interesting in that we find them *within* critical digital studies. In fact, these last two responses are some of the most popular positions in media studies today. Response 6 freely admits the cultural and political nature of math, code, logic, and software. Response 6 asserts, however, that the best way to understand the culture and politics of math is to look not at math but at subjects. Persons and their bodies become the legible substrates on which the various successes and failings of technology are inscribed. These folks tend either to be Foucauldians — "if you want to understand tech, first you have to understand power." Or they tack more toward anthropology and the human sciences — "if you want to understand tech, first you have to understand people." Either way, math falls out of the frame.

Response #7: "Focus on Use"

"Math is just a tool. Sure, algorithms can be cultural and political, but that's a truism for most things. If racist or sexist values are deployed technically, then technology will appear racist or sexist. Math is a neutral vessel, but it's rarely objective because it harbors people's goals and intentions. To remedy any perceived bias, focus on the cultural and political context in which tech is used. In other words don't talk about sexist algorithms so much as sexist uses of tech or sexist contexts."

Last but not least, a common response to the question of political tech — arguably the most common response, at least for those "in the know" — is to say that code and software are embedded with values. What values exactly? The values of their creators, which is to say all the biases and assumptions of whoever designs the algorithm. Thus if you have a racist algorithm, it's because some racist designer somewhere made it that way. If you have sexist software, it's because some coder was negligent. If this argument sounds familiar, it should: it's a version of the gun rights argument that "guns don't kill people, people kill people." Only now the argument is: math doesn't hurt people, negligent mathematicians hurt people (using math). Sometimes we call this the Neutral Vessel response — sometimes the Just A Tool response — because it turns tech into a neutral, valueless vessel ready to receive someone else's values, or a passive tool waiting to accomplish someone else's agenda.

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What do these responses all have in common? First, they all *delink* math and code from culture and politics. Either the link is explicitly denied (responses 1-3) or the link is acknowledged before being disavowed (responses 4-7). So while the non-denial

responses (4-7) seem more enlightened, given how they admit culture and politics, they remain particularly pernicious since they divert attention elsewhere. They suggest that we investigate the essence or non-essence of math, that we focus on math's use, or on the subjects of math — anything to avoid looking at math itself.

Overall I see this as a kind of “fear of media.” Whether in denial or acknowledgement, all of the responses work to undermine the notion that math, code, logic, or software are, or could be, a medium at all. If math were a full-fledged medium, one would need to attend to its affordances, its forms and structures, its genres, its modes of signification, its various lapses and slippages, and all the many other qualities and capacities (active or passive) that make up a mode of mediation.

Ironically this fear of media tends to perpetuate stereotypes rather than remedy them. For instance, the “neutral vessel” is an ancient trope for female sexuality going back at least to Aristotle if not earlier, as are neutral media substrates more generally (matter as *mater*/mother, feminine substrates receiving masculine form, and so on). And the act of “injecting ethics” or “embedding values” into an otherwise passive, receptive technology resembles a kind of insemination. In other words “fear of media” also means “fear of the feminine.”

Yet most significantly, all the above responses favor incidental bias over essential bias. None of them asserts any sort of specific quality inherent to the nature of math or code. Hence the question remains: do math and code contain an essential bias, and, if so, what is it? Not that long ago affirmative answers would have easily been forthcoming. Rationality is an “iron cage” (Max Weber). Abstraction perpetuates alienation (Karl Marx). Discrete binaries are heteronormative (Judith Butler). Still, the notion that mathematics contains an essential bias has slipped away in recent years, replaced by other arguments.

My answer is also affirmative, only the explanation is a bit different. I maintain — and will need to elaborate further in a future post — that mathematics has been defined since the ancients through an elemental typing (or gendering), and that within such typing there exists a general segregation or prohibition on the mixing of types, and that the two core types themselves (geometry and arithmetic) are mutually intertwined using notions of hierarchy, foreignness, priority, and origin. Given the politicized nature of such a scenario — gendering, segregation, hierarchy, origin — only one conclusion is possible, that whatever incidental biases it may bear, mathematics also contains an essential bias. Any analysis of the culture and politics of math and code will need to address this core directly, if not now then soon.

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